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(54) **Printing system, printing method, data server, recording medium, and program**

(57) An application server (1), a data server (2), and a printer (4) are connected to one another via a communication network (5). The application server (1) executes application software. Then, the application server (1) generates print data for printing an interim result or final

result of processing performed by the application software, and sends the print data to the data server (2). The data server (2) provides the supplied print data to the printer (4). The printer (4) performs printing in accordance with the provided print data.

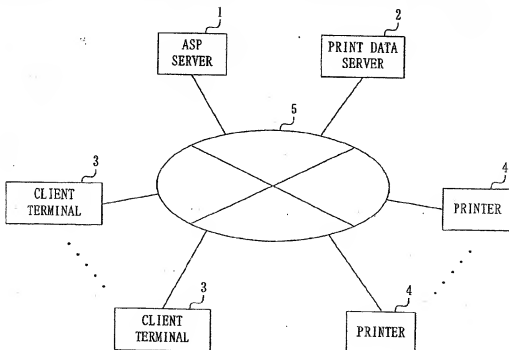


FIG. 1

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Description

[0001] The present invention relates to a system, a method, a data server, a recording medium and a program for performing printing via a communications network.

[0002] Conventionally, printing through a closed network, such as a network built in a company, has been performed with the use of a technique such as disclosed in Unexamined Japanese Patent Application KOKAI Publication No. H4-317118, for example. Specifically, using a control device for controlling a plurality of printers, print data supplied from a plurality of host devices are distributed efficiently to the plurality of printers.

[0003] The content of Unexamined Japanese Patent Application KOKAI Publication No. H4-317118 is incorporated herein by reference.

[0004] There have been known application service providers (ASP) that offer services for providing application software such as business software through the Internet.

[0005] Some ASPs offer their services using a so-called SBC (Server Based Computing) method.

[0006] According to the SBC method, client software designed exclusively for utilizing application software provided by the ASP server is preinstalled in a terminal of the user of this service. The user utilizes the application software provided by the ASP, by using the client software installed in his/her terminal.

[0007] In this SBC method, if the user wants to print out the interim result or final result of processing performed by the application software, the user once transfers the print data from the ASP server to his/her terminal. Then, the user outputs the transferred print data to a printer which is to print the print data.

[0008] However, such a printing method in this SBC system may give a heavy load on the communication between the ASP server and the user's terminal, if the print data includes a large amount. As a result, not only this user's terminal which instructs printing, but also other terminals may not obtain a quick response.

[0009] Accordingly, an object of the present invention is to provide a printing system, a printing method, a data server, a recording medium, and a program for reducing the load to be imposed on communication between a server executing application software and a user terminal.

[0010] To accomplish the above object, a printing system according to a first aspect of the present invention comprises:

an application server (1) which executes application software;
a data server (2) which provides print data for printing an interim result or final result of processing performed by the application software; and
a printer (4) which performs printing in accordance with the print data provided by the data server (2),

characterized in that:

the application server (1), the data server (2), and the printer (4) are connected to one another via a communication network (5);

the application server (1) includes a data generator (11) which generates the print data, and a first data sender (12) which sends the generated print data to the data server (2); and
the data server (2) provides the print data supplied from the first data sender (12) to the printer (4).

[0011] According to this invention, the print data is provided to the printer from the data server which is prepared independently from the application server. Therefore, even if a user terminal is connected to the application server, load to be imposed on the communication between the application server and the user terminal due to a printing operation, can be reduced.

[0012] The printing system may further comprise a user terminal (3) which supplies a URL (Uniform Resource Locator) for specifying the printer (4) to which the print data is to be provided, to the data server (2) in accordance with an operation of a user.

[0013] In this case, the data server (2) may send the print data to the printer (4) which is specified by the URL.

[0014] The data server (2) may include:

a determiner (21) which determines whether or not printing can be performed by the printer (4); and
a second data sender (22) which sends the print data to the printer (4), in a case where the determiner (21) determines that printing can be performed by the printer (4).

[0015] The data server (2) may store the print data supplied from the application server (1), and may supply a URL (Uniform Resource Locator) for specifying a storage location of the print data to the printer (4).

[0016] In this case, the printer (4) may include a downloader (41) which downloads the print data from the storage location specified by the URL.

[0017] The printer (4) may notify the data server (2) of completion of printing, and the data server (2) may erase the stored print data in response to a notification from the printer (4).

[0018] A printing system according to a second aspect of the present invention comprises:

an application server (1) which executes application software;
a data server (2) which provides print data for printing an interim result or final result of processing performed by the application software; and
a plurality of printers (4) which perform printing in accordance with the print data provided by the data server (2),

characterized in that:

the application server (1), the data server (2), and the plurality of printers (4) are connected to one another via a communication network (5);

the data server (2) includes a data generator (24) which generates the print data, and a sender (25) which sends the generated print data to a predetermined printer (4).

[0019] Types of the plurality of printers (4) may be different from each other.

[0020] In this case, the data server (2) may include a plurality of printer drivers (16) corresponding to the plurality of printers (4) respectively, and a specifier (23) which specifies a printer driver (16) which corresponds to the predetermined printer (4), and the data generator (24) may generate the print data by executing the printer driver (16) specified by the specifier (23).

[0021] The specifier (23) may obtain information regarding the predetermined printer (4) from the predetermined printer (4), and may specify the printer driver (16) which corresponds to the predetermined printer (4) using the obtained information.

[0022] A printing method according to a third aspect of the present invention comprises:

an executing step of executing application software in an application server (1);

a data generating step of generating in the application server (1), print data for printing an interim result or final result of processing performed by the application software;

a first data sending step of sending the print data from the application server (1) to a data server (2) connected thereto via a communication network (5);

a data providing step of providing from the data server (2), the print data supplied from the application server (1), to a printer (4) connected to the data server (2) via the communication network (5); and
a printing step of performing printing in the printer (4) in accordance with the print data provided from the data server (2).

[0023] The printing method may further comprise a first URL supplying step of supplying from a user terminal (3) connected to the communication network (5), a URL (Uniform Resource Locator) for specifying the printer (4) to which the print data is to be provided, to the data server (2) in accordance with an operation of a user.

[0024] In this case, the data providing step may include a second data sending step of sending the print data from the data server (2) to the printer (4) which is specified by the URL.

[0025] The printing method may further comprise a determining step of determining in the data server (2)

whether or not printing can be performed by the printer (4).

[0026] In this case, the second data sending step may include a step of sending the print data from the data server (2) in a case where it is determined in the determining step that printing can be performed.

[0027] The printing method may further comprise:

a storing step of storing the print data supplied from the application server (1) in the data server (2);

a second URL supplying step of supplying from the data server (2), a URL (Uniform Resource Locator) for specifying a storage location of the print data to the printer (4); and

a downloading step of downloading the print data to the printer (4) from the storage location specified by the URL.

[0028] In this case, the printing step may include a step of performing printing in accordance with the print data downloaded to the printer (4).

[0029] The printing method may further comprise:

a notifying step of notifying from the printer (4) that printing is completed, to the data server (2); and
an erasing step of erasing the print data stored in the data server (2), in response to a notification from the printer (4).

[0030] A printing method according to a fourth aspect of the present invention comprises:

an executing step of executing application software in an application server (1);

a data generating step of generating in a data server (2) connected to the application server (1) via a communication network (5), print data for printing an interim result or final result of processing performed by the application software;

a data sending step of sending the print data from the data server (2) to a predetermined printer (4) among a plurality of printers (4) connected to the data server (2) via the communication network (5); and

a printing step of performing printing in the predetermined printer (4) in accordance with the print data supplied from the data server (2).

[0031] Types of the plurality of printers (4) may be different from each other, the data server (2) may include a plurality of printer drivers (16) corresponding to the plurality of printers (4) respectively, the printing method may further comprise a specifying step of specifying by the data server (2), a printer driver (16) which corresponds to the predetermined printer (4), and the data generating step may include a step of generating in the data server (2), the print data by executing the printer driver (16) specified in the specifying step.

[0032] The specifying step may include:

a step of obtaining by the data server (2), information regarding the predetermined printer (4) from the predetermined printer (4); and
a step of specifying by the data server (2), the printer driver (16) which corresponds to the predetermined printer (4), using the obtained information.

[0033] A data server according to a fifth aspect of the present invention generates print data for printing an interim result or final result of processing performed by application software executed by an application server (1) which is connected to the data server (2) via a communication network (5), the data server comprising:

a plurality of printer drivers (16) which correspond respectively to a plurality of different types of printers (4) which are connected to one another via the communication network (5);
a specifier (23) which specifies a printer driver (16) which corresponds to a printer (4) among the plurality of printers (4) that is the target of outputting the print data:

a data generator (24) which generates the print data by executing the printer driver (16) specified by the specifier (23); and
a sender (25) which sends the generated print data to the target printer (4).

[0034] The specifier (23) may obtain information regarding the target printer (4) from the target printer (4), and may specify the printer driver (16) which corresponds to the target printer (4) using the obtained information.

[0035] A computer-readable recording medium according to a sixth aspect of the present invention stores a program for controlling a computer to function as a data server (2) which generates print data for printing an interim result or final result of processing performed by application software executed by an application server (1) which is connected to the data server (2) via a communication network (5), the data server (2) comprising:

a plurality of printer drivers (16) which correspond respectively to a plurality of different types of printers (4) which are connected to one another via the communication network (5);
a specifier (23) which specifies a printer driver (16) which corresponds to a printer (4) among the plurality of printers (4) that is the target of outputting the print data:

a data generator (24) which generates the print data by executing the printer driver (16) specified by the specifier (23); and

a sender (25) which sends the generated print data to the target printer (4).

[0036] A program according to a seventh aspect of the present invention controls a computer to function as a data server (2) which generates print data for printing an interim result or final result of processing performed by application software executed by an application server (1) which is connected to the data server (2) via a communication network (5), the data server (2) comprising:

a plurality of printer drivers (16) which correspond respectively to a plurality of different types of printers (4) which are connected to one another via the communication network (5);
a specifier (23) which specifies a printer driver (16) which corresponds to a printer (4) among the plurality of printers (4) that is the target of outputting the print data:

a data generator (24) which generates the print data by executing the printer driver (16) specified by the specifier (23); and
a sender (25) which sends the generated print data to the target printer (4).

[0037] These objects and other objects and advantages of the present invention will become more apparent upon reading of the following detailed description and the accompanying drawings in which:

FIG. 1 is a diagram showing a structure of a printing system according to a first embodiment;
FIG. 2 is a diagram showing a structure of an ASP server included in the printing system shown in FIG. 1;
FIG. 3 is a flowchart showing an operation of the printing system according to the first embodiment;
FIG. 4 is a diagram showing a structure of a printer included in a printing system according to a second embodiment;
FIGS. 5A and 5B are flowcharts showing an operation of the printing system according to the second embodiment;
FIG. 6 is a diagram showing another structure of a print data server according to the first embodiment; and
FIG. 7 is a diagram showing another structure of the print data server according to the first embodiment.

[0038] A printing system according to a first embodiment of the present invention will be explained with reference to the drawings.

[0039] A printing system according to a first embodiment comprises an ASP (Application Service Provider) server 1, a print data server 2, a plurality of client terminals 3, a plurality of printers 4, and a network 5, as

shown in FIG. 1.

[0040] As shown in FIG. 1, the ASP server 1, the print data server 2, the plurality of client terminals 3, and the plurality of printers 4 are connected to one another via the network 5. The network 5 may be the Internet, a WAN (Wide Area Network), an intranet, a LAN (Local Area Network), or the like.

[0041] The ASP server 1 is a server device comprising a communication unit, a storage unit, and a control unit, and stores various application software to be used on the printing system. Such application software include accounting software, salary management software, electronic clinical chart creation software, text editing software, and the like. At the request of a client terminal 3, the ASP server 1 executes application software specified by this client terminal 3. Any application software will be provided by the ASP server 1 through SBC (Server Based Computing).

[0042] The communication unit includes a modem and the like, to connect the ASP server 1 to the network 5.

[0043] The storage unit comprises a hard disk, a RAM (Random Access Memory), and a ROM (Read Only Memory), and stores programs and data for activating the ASP server 1.

[0044] The control unit comprises a CPU (Central Processing Unit) and controls the operation of the ASP server 1 in accordance with the programs stored in the storage unit.

[0045] While the control unit acts in accordance with the programs stored in the storage unit, the ASP server 1 causes a print data generation function and a print data output function. In other words, the ASP server 1 functionally comprises a print data generation unit 11 and a print data output unit 12, as shown in FIG. 2.

[0046] Further, the ASP server 1 comprises various application software 13, middleware 14, and a printer driver 15, as shown in FIG. 2.

[0047] The middleware 14 intervenes between the ASP server 1 and the client terminals 3. Specifically, the middleware 14 hands over a signal supplied from a client terminal 3 to the application software 13, and sends an interim result or final result of processing performed by the application software 13 to the client terminal 3.

[0048] The printer driver 15 generates print data to be printing-processed by the printers 4.

[0049] The print data generation unit 11 executes the printer driver 15 in response to a print request supplied from a client terminal 3, so as to generate print data for printing out the interim result or final result of processing performed by the application software 13.

[0050] The print data output unit 12 outputs to the print data server 2, the print data generated by the print data generation unit 11, together with a URL (Uniform Resource Locator) supplied from the client terminal 3 for specifying a printer 4 for outputting this print data.

[0051] The print data server 2 is a Web server comprising a communication unit, a storage unit, and a con-

trol unit, and supplies the print data sent from the ASP server 1 to the specified printer 4.

[0052] The communication unit comprises a modem, etc., and connects the print data server 2 to the network 5.

[0053] The storage unit comprises a hard disk, a RAM, and a ROM, and stores programs and data for activating the print data server 2.

[0054] The control unit comprises a CPU, and controls the operation of the print data server 2 in accordance with the programs stored in the storage unit.

[0055] The print data server 2 receives print data supplied from the print data output unit 12 of the ASP server 1, and temporarily stores it. The print data server 2 sends the supplied print data to the printer 4 specified by the URL supplied together with print data.

[0056] Each client terminal 3 is a personal computer comprising a communication unit, an input unit, a display unit, a storage unit, and a control unit, for example.

[0057] The communication unit comprises a modem, etc., and connects the client terminal 3 to the network 5.

[0058] The input unit comprises at least one input means, such as a keyboard, a mouse, an input key, a touch panel, and the like, and is operated by a user.

[0059] The display unit comprises a CRT (Cathode Ray Tube) or a liquid crystal panel, and displays an interim result or final result of processing performed by the application software 13.

[0060] The storage unit comprises at least one storage means such as a hard disk, a RAM, a ROM, and the like, and stores programs and data for activating the client terminal 3.

[0061] The control unit comprises a CPU, and controls the operation of the client terminal 3 in accordance with the programs stored in the storage unit.

[0062] Each client terminal 3 may be a Thin Client terminal that is cheap and has no environment for executing application software.

[0063] Each client terminal 3 requests the ASP server 1 to execute the application software 13 designated by a user, in accordance with the operation of the user. Further, each client terminal 3 requests the ASP server 1 to output an interim result or final result of processing performed by the application software 13 to a printer 4 specified by the user.

[0064] Each printer 4 is identified by a URL. Each printer 4 prints an interim result or final result of processing performed by the application software 13, in accordance with print data supplied from the print data server 2.

[0065] Next, the operation of the printing system according to the first embodiment will be explained.

[0066] FIG. 3 is a flowchart showing the operation of the printing system.

[0067] The user of a client terminal 3 accesses the ASP server 1 by operating the client terminal 3, and performs his/her processes on the application software 13 provided by the ASP server 1.

[0068] First, the client terminal 3 accesses the ASP

server 1 through the network 5, in accordance with the operation of the user (step S101).

[0069] Then, the client terminal 3 designates application software 13 that is designated by the user, and requests the ASP server 1 to execute the designated application software 13, in accordance with the operation of the user (step S102).

[0070] In response to the request from the client terminal 3, the ASP server 1 starts executing the application software 13 designated by the client terminal 3 (step S103).

[0071] The interim result of processing performed by the application software 13 is transmitted to the client terminal 3 through the middleware 14 at any time. The client terminal 3 displays the interim result of the application software 13 supplied from the ASP server 1 for showing the result to the user.

[0072] If the user intends to print the interim result or final result of processing performed by the application software 13, the user operates the client terminal 3 and specifies a printer 4 for outputting the interim result or final result. Then, the user operates the client terminal 3 to request the ASP server 1 to print the interim result or final result.

[0073] The client terminal 3 sends a URL for specifying the printer 4 for outputting the result, and a print request signal for requesting printing of the interim result or final result to the ASP server 1 via the network 5 in accordance with the operation of the user (step S104).

[0074] In response to the print request signal from the client terminal 3, the print data generation unit 11 of the ASP server 1 generates print data for printing the interim result or final result obtained by the application software 13 by executing the printer driver 15 (step S105).

[0075] Then, the print data generation unit 11 of the ASP server 1 outputs the generated print data to the print data output unit 12. In response to the print data supplied from the print data generation unit 11, the print data output unit 12 sends the supplied print data and the URL supplied from the client terminal 3 to the print data server 2 (step S106).

[0076] In response to the URL and print data sent from the ASP server 1, the print data server 2 acquires the supplied print data and stores it (step S107).

[0077] Then, the print data server 2 sends the supplied print data to the printer 4 specified by the supplied URL using a push technique, for example (step S108).

[0078] The printer 4, which is supplied with the print data from the print data server 2, prints the interim result or final result of the application software 13, in accordance with this supplied print data (step S109).

[0079] When printing is completed, the printer 4 sends a completion signal representing the completion of printing to the print data server 2 (step S110).

[0080] In response to the completion signal supplied from the printer 4, the print data server 2 erases the print data which is stored in step S107. Then, the print data server 2 sends the completion signal supplied from the

printer 4 to the ASP server 1 (step S111).

[0081] The ASP server 1 sends the completion signal supplied from the print data server 2 to the client terminal 3 via the middleware 14 (step S112).

5 [0082] In response to the completion signal supplied from the ASP server 1, the client terminal 3 notifies the user of the completion of printing (step S113). For example, the client terminal 3 displays a message representing the completion of printing. Thus, the user can know the completion of printing.

10 [0083] As described above, the print data is supplied to the printer 4 from the print data server 2, which is prepared independently from the ASP server 1. Therefore, the communication line between the ASP server 1 and the client terminal 3 will not be occupied by print data. Further, the ASP server 1 can concentrate upon execution of the application software 13. This prevents the processing speed of the application software 13 from being lowered by the printing operation.

20 [0084] Next, a printing system according to a second embodiment of the present invention will be explained with reference to the drawings.

[0085] The printing system according to the second embodiment comprises an ASP server 1, a print data server 2, a plurality of client terminals 3, a plurality of printers 4, and a network 5, likewise the first embodiment.

[0086] According to the second embodiment, the print data server 2 will not send print data to the printers 4, but the printers 4 themselves get print data stored in the print data server 2.

30 [0087] Print data stored in the print data server 2 is identified by a URL.

[0088] Each printer 4 comprises an ordinary printing function, and also a downloading function for downloading print data specified by a URL from the print data server 2. Specifically, each printer 4 comprises a data acquiring unit 41 for downloading print data from the print data server 2, as shown in FIG. 4. Each printer 4 performs printing in accordance with the print data acquired by the data acquiring unit 41.

40 [0089] The structure of the printing system according to the second embodiment is substantially the same as that of the printing system according to the first embodiment, except the above described point.

45 [0090] The operation of the printing system according to the second embodiment will now be explained.

[0091] FIGS. 5A and 5B are flowcharts showing the operation of the printing system according to the second embodiment.

50 [0092] Processes from user's access to the ASP server 1 using a client terminal 3, to execution of the application software 13 by the ASP server 1 in response to the request from the client terminal 3 (steps S201 to S203) are substantially the same as steps S101 to S103 explained in the first embodiment.

55 [0093] In a case where a user wants to print an interim result or final result of processing performed by the ap-

plication software 13, the user operates his/her client terminal 3 to request the ASP server 1 to print the interim result or final result. At this time, the user needs not to specify a printer 4 for outputting the result.

[0094] The client terminal 3 sends a print request signal for requesting printing of the interim result or final result to the ASP server 1 via the network 5, in accordance with the operation of the user (step S204).

[0095] In response to the print request signal from the client terminal 3, the print data generation unit 11 of the ASP server 1 generates print data for printing the interim result or final result of processing performed by the application software 13 by executing the printer driver 15 (step S205).

[0096] Then, the print data generation unit 11 of the ASP server 1 outputs the generated print data to the print data output unit 12. In response to the print data supplied from the print data generation unit 11, the print data output unit 12 sends the supplied print data to the print data server 2 (step S206).

[0097] In response to the print data sent from the ASP server 1, the print data server 2 acquires the supplied print data and stores it (step S207).

[0098] Then, the print data server 2 sends a URL for specifying the storage location of the print data now stored, to the ASP server 1 (step S208).

[0099] In response to the URL supplied from the print data server 2, the ASP server 1 sends the supplied URL to the client terminal 3 via the middleware 14 (step S209).

[0100] The client terminal 3 notifies the user that generation of the print data is completed, in response to the URL supplied from the ASP server 1 (step S210). For example, the client terminal 3 displays a message representing that generation of the print data is completed.

[0101] The user, by operating the client terminal 3, specifies a printer 4 for outputting the interim result or final result of processing performed by the application software 13. Then, the user requests the specified printer 4 to print the interim result or final result by operating the client terminal 3.

[0102] In accordance with the operation of the user, the client terminal 3 sends the supplied URL of the print data, and a print request signal for requesting printing of the interim result or final result, to the specified printer 4 via the network 5 (step S211).

[0103] The data acquiring unit 41 of the printer 4 accesses the print data server 2 via the network 5, in response to the print request signal supplied from the client terminal 3. Then, the data acquiring unit 41, downloads the print data specified by the URL supplied together with the print request signal, from the print data server 2 (step S212).

[0104] Then, the printer 4 prints the interim result or final result of processing performed by the application software 13, in accordance with the downloaded print data (step S213).

[0105] Processes after completion of printing (proc-

esses from step S214 and thereafter) are substantially the same as processes from step S110 and thereafter shown in the first embodiment.

[0106] As described above, the print data is supplied to the printer 4 from the print data server 2 prepared independently from the ASP server 1. On account of this, the communication line between the ASP server 1 and the client terminal 3 will not be occupied by the print data. Further, since the ASP server 1 can concentrate upon execution of the application software 13, the processing speed of the application software 13 will not be lowered by the printing operation.

[0107] Furthermore, since the printer 4 accesses the print data server 2 and downloads the print data, the printer 4 can perform printing, even if a firewall is set between the print data server 2 and the printer 4.

[0108] The print data server 2 shown in the first embodiment may have a determination function for determining whether or not printing can be performed by the printer 4 specified by the client terminal 3. In other words, the print data server 2 may comprise a determination unit 21 for determining whether or not printing can be performed, and an output unit 22 for outputting the print data to the printer 4 in accordance with a determination result obtained by the determination unit 21, as described in FIG. 6.

[0109] The determination unit 21 sends, in response to a URL and print data supplied from the ASP server 1, a test signal to the printer 4 specified by the supplied URL. Then, the determination unit 21 determines whether or not printing can be performed by the specified printer 4, by checking whether or not it receives a reply to the sent test signal, for example.

[0110] In the case where it determines that printing cannot be performed, the determination unit 21 outputs an impossibility signal representing that printing cannot be performed, to the output unit 22.

[0111] In response to the impossibility signal from the determination unit 21, the output unit 22 sends a change request for requesting change of printers 4 for outputting the print data, to the client terminal 3 via the ASP server 1.

[0112] On the contrary, in the case where the determination unit 21 determines that printing can be performed, it outputs a possibility signal representing that printing can be performed to the output unit 22.

[0113] In response to the possibility signal from the determination unit 21, the output unit 22 sends the print data supplied from the ASP server 1 to the printer 4.

[0114] If the print data server 2 comprises the above described functions, it can take an appropriate action in a case where a firewall is set between the print data server 2 and the printer 4, or in a case where the power of the printer 4 is turned off.

[0115] The plurality of printers 4 shown in the first embodiment may be of different types. In this case, as shown in FIG. 7, the print data server 2 may comprise a plurality of printer drivers 16. Each printer driver 16

corresponds to one of the plurality of printers 4, and generates print data for the printer 4 to which it corresponds. Further, the print data server 2 may comprise a driver specifying unit 23, a print data generation unit 24 and a data sending unit 25.

[0116] In this case, the print data output unit 12 of the ASP server 1 outputs a URL of a printer 4 and an interim result or final result of processing performed by the application software 13 to the print data server 2 in response to a print request signal from the client terminal 3.

[0117] In response to the URL supplied from the ASP server 1, the driver specifying unit 23 of the print data server 2 accesses a printer 4 specified by the supplied URL.

[0118] Then, the driver specifying unit 23 obtains information regarding the accessed printer 4 (type, etc.) from this printer 4.

[0119] The driver specifying unit 23 specifies a printer driver 16 which corresponds to the specified printer 4, by using the obtained information.

[0120] The print data generation unit 24 generates print data for printing the interim result or final result supplied from the ASP server 1, by executing the printer driver 16 specified by the driver specifying unit 23 using the interim result or final result.

[0121] Then, the data sending unit 25 sends the print data generated by the print data generation unit 24 to the printer specified by the supplied URL, using a push technique, for example.

[0122] If the print data server 2 comprises the above described structure, there is no need of unifying the type of the printers 4.

[0123] The servers and terminals of the present invention can be realized by a general computer, without the need for a dedicated apparatus. A program and data for controlling a computer to execute the above-described processes may be recorded on a medium (a flexible disk, CD-ROM, DVD or the like) and distributed, and the program may be installed into the computer and run on an OS (Operating System) to execute the above-described processes, thereby achieving the servers and terminals of the present invention. The above program and data may be stored in a disk device or the like included in a server device on the Internet, and embedded in a carrier wave. The program and data embedded in the carrier wave may be downloaded into the computer so as to realize the servers and terminals of the present invention.

[0124] Various embodiments and changes may be made thereto without departing from the broad spirit and scope of the invention. The above-described embodiments are intended to illustrate the present invention, not to limit the scope of the present invention. The scope of the present invention is shown by the attached claims rather than the embodiments. Various modifications made within the meaning of an equivalent of the claims of the invention and within the claims are to be

regarded to be in the scope of the present invention.

Claims

1. A printing system characterized by comprising:

an application server (1) which executes application software;
a data server (2) which provides print data for printing an interim result or final result of processing performed by the application software; and
a printer (4) which performs printing in accordance with the print data provided by said data server (2).

characterized in that:

said application server (1), said data server (2), and said printer (4) are connected to one another via a communication network (5);
said application server (1) includes a data generator (11) which generates the print data, and a first data sender (12) which sends the generated print data to said data server (2); and
said data server (2) provides the print data supplied from said first data sender (12) to said printer (4).

2. The printing system according to claim 1, characterized by further comprising a user terminal (3) which supplies a URL (Uniform Resource Locator) for specifying said printer (4) to which the print data is to be provided, to said data server (2) in accordance with an operation of a user,

characterized in that said data server (2) sends the print data to said printer (4) which is specified by the URL.

3. The printing system according to claim 2, characterized in that

said data server (2) includes:

a determiner (21) which determines whether or not printing can be performed by said printer (4); and
a second data sender (22) which sends the print data to said printer (4), in a case where said determiner (21) determines that printing can be performed by said printer (4).

4. The printing system according to claim 1, characterized in that:

said data server (2) stores the print data supplied from said application server (1), and supplies a URL (Uniform Resource Locator) for

specifying a storage location of the print data to said printer (4); and
said printer (4) includes a downloader (41) which downloads the print data from the storage location specified by the URL.

5. The printing system according to claim 4, **characterized in that:**

said printer (4) notifies said data server (2) of completion of printing; and
said data server (2) erases the stored print data in response to a notification from said printer (4).

6. A printing system **characterized by** comprising:

an application server (1) which executes application software;
a data server (2) which provides print data for printing an interim result or final result of processing performed by the application software; and
a plurality of printers (4) which perform printing in accordance with the print data provided by said data server (2),

characterized in that:

said application server (1), said data server (2), and said plurality of printers (4) are connected to one another via a communication network (5);

said data server (2) includes a data generator (24) which generates the print data, and a sender (25) which sends the generated print data to a predetermined printer (4).

7. The printing system according to claim 6, **characterized in that:**

types of said plurality of printers (4) are different from each other;
said data server (2) includes a plurality of printer drivers (16) corresponding to said plurality of printers (4) respectively, and a specifier (23) which specifies a printer driver (16) which corresponds to said predetermined printer (4); and
said data generator (24) generates the print data by executing said printer driver (16) specified by said specifier (23).

8. The printing system according to claim 7, **characterized in that**

said specifier (23) obtains information regarding said predetermined printer (4) from said predetermined printer (4), and specifies said printer driver (16) which corresponds to said predetermined print-

er (4) using the obtained information.

9. A printing method **characterized by** comprising:

an executing step of executing application software in an application server (1);
a data generating step of generating in said application server (1), print data for printing an interim result or final result of processing performed by the application software;
a first data sending step of sending the print data from said application server (1) to a data server (2) connected thereto via a communication network (5);
a data providing step of providing from said data server (2), the print data supplied from said application server (1), to a printer (4) connected to said data server (2) via said communication network (5); and
a printing step of performing printing in said printer (4) in accordance with the print data provided from said data server (2).

10. The printing method according to claim 9, **characterized by** further comprising

a first URL supplying step of supplying from a user terminal (3) connected to said communication network (5), a URL (Uniform Resource Locator) for specifying said printer (4) to which the print data is to be provided, to said data server (2) in accordance with an operation of a user,

characterized in that said data providing step includes a second data sending step of sending the print data from said data server (2) to said printer (4) which is specified by the URL.

11. The printing method according to claim 10, **characterized by** further comprising

a determining step of determining in said data server (2) whether or not printing can be performed by said printer (4),

characterized in that said second data sending step includes a step of sending the print data from said data server (2) in a case where it is determined in said determining step that printing can be performed.

12. The printing method according to claim 9, **characterized by** further comprising:

a storing step of storing the print data supplied from said application server (1) in said data server (2);

a second URL supplying step of supplying from said data server (2), a URL (Uniform Resource Locator) for specifying a storage location of the print data to said printer (4); and

a downloading step of downloading the print

data to said printer (4) from the storage location specified by the URL,

characterized in that said printing step includes a step of performing printing in accordance with the print data downloaded to said printer (4).

13. The printing method according to claim 12, characterized by further comprising:

a notifying step of notifying from said printer (4) that printing is completed, to said data server (2); and

an erasing step of erasing the print data stored in said data server (2), in response to a notification from said printer (4).

14. A printing method characterized by comprising:

an executing step of executing application software in an application server (1);

a data generating step of generating in a data server (2) connected to said application server (1) via a communication network (5), print data for printing an interim result or final result of processing performed by the application software;

a data sending step of sending the print data from said data server (2) to a predetermined printer (4) among a plurality of printers (4) connected to said data server (2) via said communication network (5); and

a printing step of performing printing in said predetermined printer (4) in accordance with the print data supplied from said data server (2).

15. The printing method according to claim 14, characterized in that:

types of said plurality of printers (4) are different from each other;

said data server (2) includes a plurality of printer drivers (16) corresponding to said plurality of printers (4) respectively;

said printing method further comprises a specifying step of specifying by said data server (2), a printer driver (16) which corresponds to said predetermined printer (4); and

said data generating step includes a step of generating in said data server (2), the print data by executing said printer driver (16) specified in said specifying step.

16. The printing method according to claim 15, characterized in that

said specifying step includes:

a step of obtaining by said data server (2), in-

formation regarding said predetermined printer (4) from said predetermined printer (4); and a step of specifying by said data server (2), said printer driver (16) which corresponds to said predetermined printer (4), using the obtained information.

17. A data server (2) which generates print data for printing an interim result or final result of processing performed by application software executed by an application server (1) which is connected to said data server (2) via a communication network (5), said data server characterized by comprising:

a plurality of printer drivers (16) which correspond respectively to a plurality of different types of printers (4) which are connected to one another via said communication network (5); a specifier (23) which specifies a printer driver (16) which corresponds to a printer (4) among said plurality of printers (4) that is the target of outputting the print data;

a data generator (24) which generates the print data by executing said printer driver (16) specified by said specifier (23); and a sender (25) which sends the generated print data to said target printer (4).

18. The data server according to claim 17, characterized in that

said specifier (23) obtains information regarding said target printer (4) from said target printer (4), and specifies said printer driver (16) which corresponds to said target printer (4) using the obtained information.

19. A computer-readable recording medium which stores a program for controlling a computer to function as a data server (2) which generates print data for printing an interim result or final result of processing performed by application software executed by an application server (1) which is connected to said data server (2) via a communication network (5), said data server (2) characterized by comprising:

a plurality of printer drivers (16) which correspond respectively to a plurality of different types of printers (4) which are connected to one another via said communication network (5); a specifier (23) which specifies a printer driver (16) which corresponds to a printer (4) among said plurality of printers (4) that is the target of outputting the print data;

a data generator (24) which generates the print data by executing said printer driver

(16) specified by said specifier (23); and
a sender (25) which sends the generated
print data to said target printer (4).

20. A program for controlling a computer to function as
a data server (2) which generates print data for
printing an interim result or final result of processing
performed by application software executed by an
application server (1) which is connected to said data
server (2) via a communication network (5), said
data server (2) **characterized by** comprising:

a plurality of printer drivers (16) which corre-
spond respectively to a plurality of different
types of printers (4) which are connected to one
another via said communication network (5);
a specifier (23) which specifies a printer driver
(16) which corresponds to a printer (4) among
said plurality of printers (4) that is the target of
outputting the print data:

a data generator (24) which generates the
print data by executing said printer driver
(16) specified by said specifier (23); and
a sender (25) which sends the generated
print data to said target printer (4).

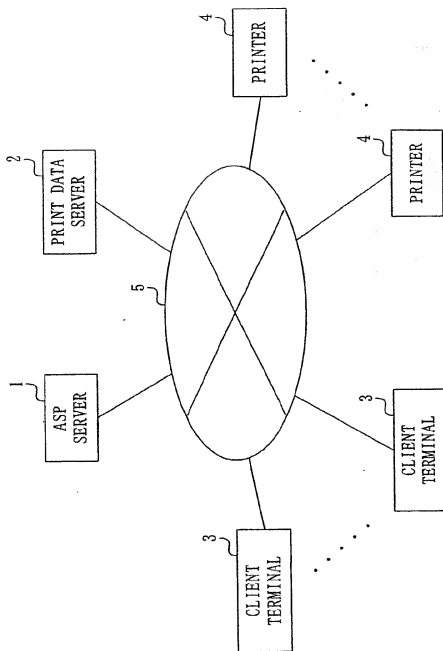


FIG. 1

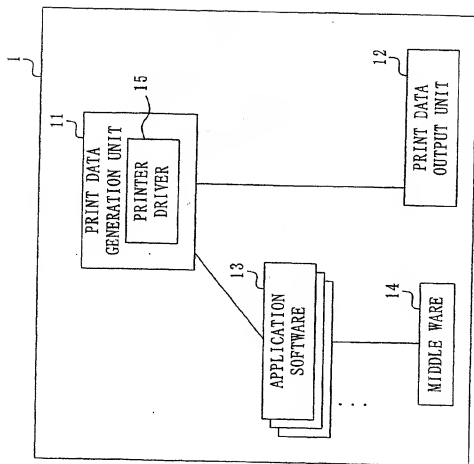


FIG. 2

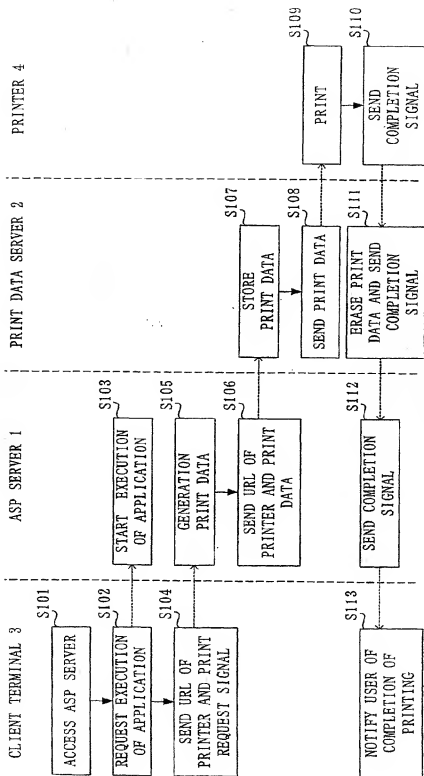


FIG. 3

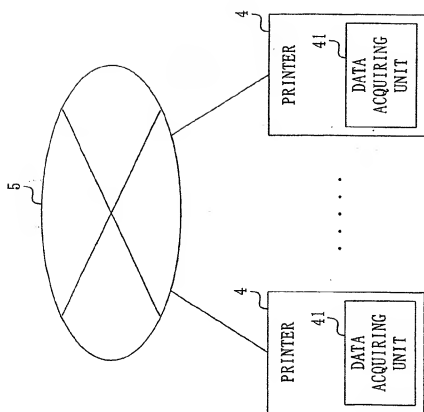


FIG. 4

PRINTER 4

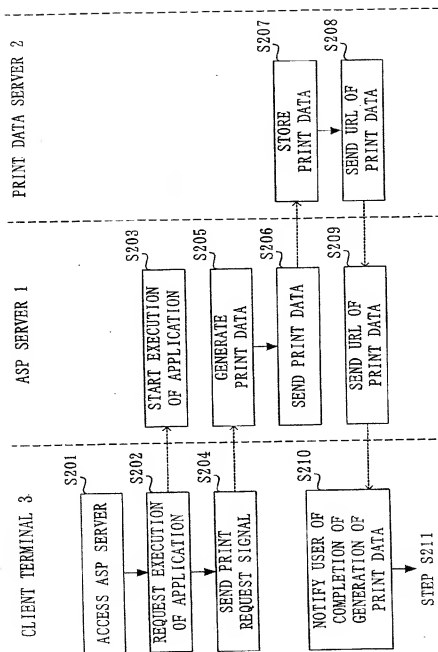


FIG. 5A

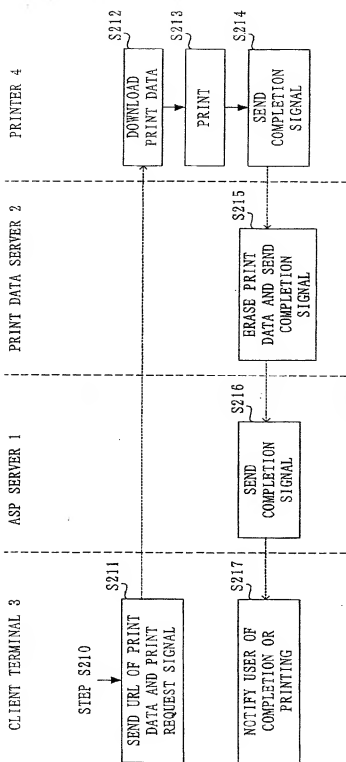


FIG. 5B

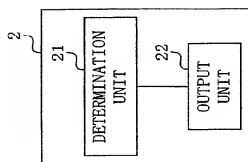


FIG. 6

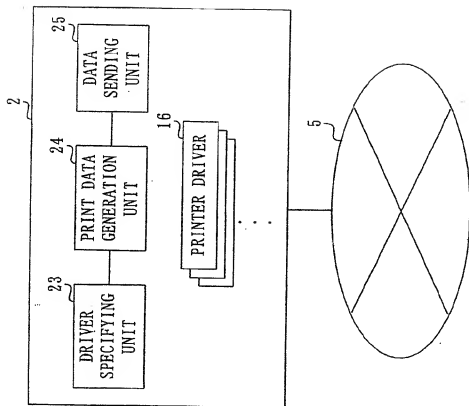


FIG. 7

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(54) **Printing system, printing method, data server, recording medium, and program**

(57) An application server (1), a data server (2), and a printer (4) are connected to one another via a communication network (5). The application server (1) executes application software. Then, the application server (1) generates print data for printing an interim result or final

result of processing performed by the application software, and sends the print data to the data server (2). The data server (2) provides the supplied print data to the printer (4). The printer (4) performs printing in accordance with the provided print data.

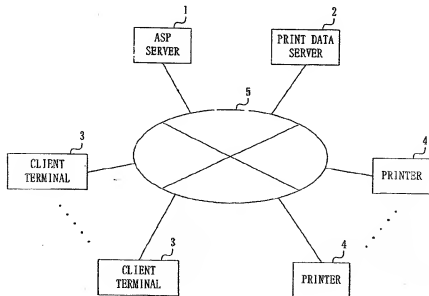


FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 02 01 4948

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IntCl.7)
X	EP 0 860 986 A (FUJI PHOTO FILM CO LTD) 26 August 1998 (1998-08-26) * the whole document *	1-4, 6, 9, 14, 17, 19, 20	G06F3/12
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			TECHNICAL FIELDS SEARCHED (IntCl.7)
			G06F G06K H04N
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		4 March 2003	Weiss, P
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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04-03-2003

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